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On the problem of categorizing students based on their cognitive styles and teaching strategies

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Abstract

The research determines different types of students according to their dominant cognitive learning styles. We are focused on the students of Russian language at high school, acquiring statistical representation of various typological groups we cluster the students into to verify whether the development of metacognitive skills does improve the efficiency of learning foreign languages.

The research includes a survey based on the works by Howard Gardner and others. We categorize students according to their dominant cognitive learning styles and corresponding teaching strategies. Two hundred respondents were included in the survey. The paper also provides a historical background of the subject.

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Keywords:Howard Gardner; Multiple Intelligences; teaching strategies; cognitive learning styles

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1. Introduction

Compulsory teaching of a second foreign language no later than from the 8th grade of school was introduced in the academic year 2013/2014. This step is a reflection of the EU policy of multilingualism and multiculturalism. In connection with this, an increase has been recorded in the number of schools that offer Russian as well as an increase in the number of students who choose this language apart from English language. In the center of our interest lies the classification of types of students who chose Russian as the second foreign language. If we take into account the fact that one of the basic approaches of modern pedagogy is paedocentrism, we can see possibilities of improving the efficiency of teaching the first foreign language as well as the second foreign language in the classification of students according to the type of learning (type of intellect) and subsequent individualization of teaching with regard to each of the types. In conducting our research, we depart from H. Gardner's theory.

2. Preceding methodology

In the 1970s in the USA, psychiatrists John Grinder and Richard Bandler dealt with the issue of neurolinguistic programming. The scholars examined the behavior of very successful people and attempted to define basic elements in their communication and behavior that positively affect their success. This is the basis of the theory of multiple intelligences, a method which gives rise to numerous debates among scholars but which has found application in the curricula of many American educational institutions. This theory is based on the philosophy of language teaching according to which the intellect of man is composed of many different equivalent intellects, which we must first uncover, and only then it is possible to develop them in the process of teaching. This theory was developed by the American scholar Howard Gardner as a counterpoint to the classic IQ test, based on the idea of a compact innate and unchangeable human intellect. In Gardner's view, IQ tests only measure the linguistic and logical skills of a person, but teaching practice shows that people gain knowledge in different ways. The scholar further contends that language is not connected only with the linguistic abilities of an individual, but with all parts of human intellect. Besides, this theory also had its predecessors. As early as in 1904, the French scholar and psychologist Alfred Binet dealt, in a sense, with a variety of intelligence when he and Theodor Simon created, on the basis of their long-term examination of children in their natural environment, a so-called Binet–Simon scale, which was a scale of various skills, broken down by age of children, which was, according to the authors, typical for the mastery of these skills. This finding was the core of Binet's claim that it is not possible to generalize intelligence, that it is diverse; he also examined the approach of mentally disabled children to the mastery of these skills (Lojová & Vlčková, 2011; Gardner, 1993; Binet, 1907).

A pioneer in the field of examination of children in terms of their preferred intelligence was, without a doubt, Maria Montessori. In her profession as director of the school Casa dei Bambini (C*hildren's House*), she was fully aware of the peculiarities and differences of individual children, and therefore also promoted individual work with each child or their division into smaller groups according to the predominant style of learning.
In the 1970s, phenomenological psychology appeared, examining subjective human experience, on the basis of which the Swedish scholar and psychologist FerenceMarton, together with his British colleague Noel Entwistl, later introduced a qualitative research method, phenomenography (Lojová & Vlčková, 2011; Mareš, 1998).

In 1984, American theorist David Kolb focused on the natural preference of learning styles and, based on his so-called experiential learning psychology, defined four types of students: 1. diverging (sensitive students, able to look at a problem from different angles, they like observing), 2. assimilating (students requiring a clear logical explanation), 3. converging (students preferring practical experience over theory, they like solving problems), and 4. accommodating (students who like experimenting, during which they involve their excellent intuition and instincts) (Osland & Kolb & Rubin, 2006).

3. Theory of multiple intelligences

The theory of multiple intelligences was comprehensively described for the first time in Gardner's 1983 publication "*Frames of Mind: The Theory of Multiple Intelligences*". Gardner sees intelligence as the ability to solve problems

and to participate in the results that are important for a particular culture or community. In his book, the author formulates a number of criteria that define intelligence as a prerequisite of the ability to solve problems or difficulties fitted into cultural context and create one's judgment. The author defines the following eight types of intellect:

- Verbal or linguistic intelligence (*so-called "wordsmart" or "booksmart"*)
- Logical-mathematical intelligence (*so-called "numbersmart" or "reasoningsmart"*)
- Visual-spatial intelligence (*so-called "picturesmart" or "art smart"*)
- Bodily-kinesthetic intelligence (*so-called "body smart" or "movementsmart"*)
- Musical or aural intelligence (*so-called "music smart" or "soundsmart"*)
- Interpersonal intelligence (*so-called "peoplesmart" or "groupsmart"*)
- Intra-personal intelligence (*so-called "selfsmart" or "introspectionsmart"*)
- Natural or naturalist intelligence (*so-called "naturesmart" or "environmentsmart"*)

The first two types of intelligence (verbal and logical-mathematical) are most apparent mainly in the process of education in schools, the other three (visual-spatial, bodily-kinesthetic and musical) are associated with artistic movements, and the remaining three types (interpersonal, intra-personal and natural) were described by Gardner as "personal intelligence" (Gardner, 1993). However, all types are interconnected, complementary, and rarely work alone. The basis of the theory of multiple intelligence is the fact that every individual has a unique set of intelligences that interconnect and cooperate in solving problems, which is the essence of the uniqueness of each individual (Lojová & Vlčková, 2011).

Academic psychologists viewed Gardner's theory of multiple intelligence with skepticism. By contrast, it was accepted by teachers very positively. Teachers and theorists of education did not hesitate to apply this theory in practice. One of the reasons of the positive acceptance of the theory in the school environment is the fact that it provides a conceptual framework for the organization of the educational process, for the building of a new approach to the arrangement of the lessons and the classrooms themselves, and it is focused on the specific needs of different types of students (Kornhaber &Fierros &Veenema, 2004).

Mindy Kornhaber, together with her colleagues from Harvard University, in the framework of the group's project "Project Zero", which has been carrying out its research since 1967, tested 41 educational institutions in the USA that use the theory of multiple intelligences in practice by using globally standardized entrance tests for U.S. universities – SAT (Scholastic Assessment Test). The research showed that the progress of students of these schools in three years of study was really substantial; one of the findings also was a decrease in the number of missed classes and an increase in the participation in leisure activities organized by the educational establishments (Gardner, 1993; Kornhaber &Fierros &Veenema, 2004).

4. Research and results

To conduct our psycho-didactic research, the method selected was a questionnaire drawn up on the basis of the literature studied and focused on five types of students according to their predominant intelligence. All items of the questionnaire were created in accordance with the characteristics of the individual, most commonly occurring, learning styles, with the manner of receiving information by students, their typical needs, behaviors, and prevailing intelligence.

In addition to H. Gardner's theory, in compiling the questionnaire, another theory taken into account was that of the prominent Czech scholar M. Sovák, who, in his publication "*Learning need not be torture*" (*Učení nemusí být mučení*), defined four basic types of students according to their most frequent needs in the learning process. These are: 1. aural-speech, 2. visual, 3. tactile and motional, and 4. verbally-conceptual (Sovák, 1990).
Furthermore, S.F.Reif's theory, working with seven types of intelligence, sometimes called learning styles, was taken into account. The author bases her classification of students on the type of intelligence the individual uses the most. The types of intelligence are: 1. verbal, 2. logical-mathematical, 3. spatial, 4. musical, 5. bodily-kinesthetical, 6. interpersonal and 7. intra-personal (Reifová, 2007).

On the basis of the above theories, all respondents were, after the evaluation of the questionnaires, divided into five categories, which are further explored and analyzed in this paper. The types of students are: 1. aural-speech, 2. visual, 3. bodily-kinesthetic, 4. logical-mathematical, 5. verbal. The reason of the choice of these five categories was the mutual similarity and permeability of individual theories and types of classification of students according to the senses which the individual uses most frequently as well as according to the intelligence which is developed to the greatest extent in them. (See Gardner's and Rief's bodily-kinesthetic type and Sovák's tactile and motional one, logical-mathematical type by both Gardner and Rief and the verbally conceptual type by Sovák, musical and aural-speech one; and last but not least Sovák's visual type of a student, which corresponds with Rief's spatial intelligence and visually-spatial intelligence by Gardner, when a student has a high perception of drawings and sketches).
It can be easily proved using the above classification that every student has different ways of learning, different interests and motivation, and therefore different teaching activities are suitable for them. The teacher's task is thus to actively engage students in learning activities and stimulate the development of different types of intelligence and the various senses of the students.

A total of 200 students of the Russian language of different age groups from schools in the Hradec Králové region, the Pardubice region, and the Vysočina region were tested. The selection of educational institutions was significantly restricted by teaching of Russian, which unfortunately is not yet in place in all types of schools. Research was conducted in five secondary schools, and, for comparison a small sample of students of the University of Hradec Králové participated in the test too (these were students of the follow-up Master's program Teaching of Russian in lower and upper secondary school). The comparison of learning style preferences was crucial as they are changing with age because, from the perspective of ontogeny, time is an important factor influencing the development of human intelligence.
The respondents were subsequently divided into groups according to age in order to obtain an overview of their development over time (respondents aged 15 – 16 years; 17 years; 18 years; 20 – 22 years; 23 – 24 years).

In the questionnaire presented, the respondents gave their opinions on a total of 35 statements; always 7 statements were focused on each learning style of the student, his/her predominant senses and intelligence. The respondents were asked to assign a point value to each statement according to the following scale (0 = I don't agree with this statement at all, 1 = this statement describes me partially, 2 = I completely agree with this statement). Statements representing each type were not presented in blocks but were randomly mixed. In the evaluation of the questionnaires, the total number of points for each of the five types of intelligence was added up, which was subsequently verified by the sum of the number of zeros, one's and two's. The highest number of points obtained represented the biggest agreement of students with statements representing a specific type of intelligence, and therefore the greatest preference by students of this type. Summary results were recorded in charts according to the different age groups of respondents. A total of six charts were created in this research, the last of which, the sixth, is the final overview of the complex scoring of all of the surveyed respondents.
In the paper, we will only present the results and conclusions of the research conducted.

4.1. The group of students aged 15 to 16 years

The group of students aged 15 to 16 years contains a total of 58 respondents, whose score is shown in Fig. 1. In this group of respondents, two types of students are predominant: aural-speech (22.7%) and bodily-kinesthetic (22.5%). The visual (19.3%) and verbal (18.9%) types are very balanced and the logical-mathematical type has significantly fewer points (16.6%), which is generally repeated in all the surveyed groups, which also confirms the hypothesis of M. Sovák that the group of students of the logical-mathematical type is generally the least represented one.

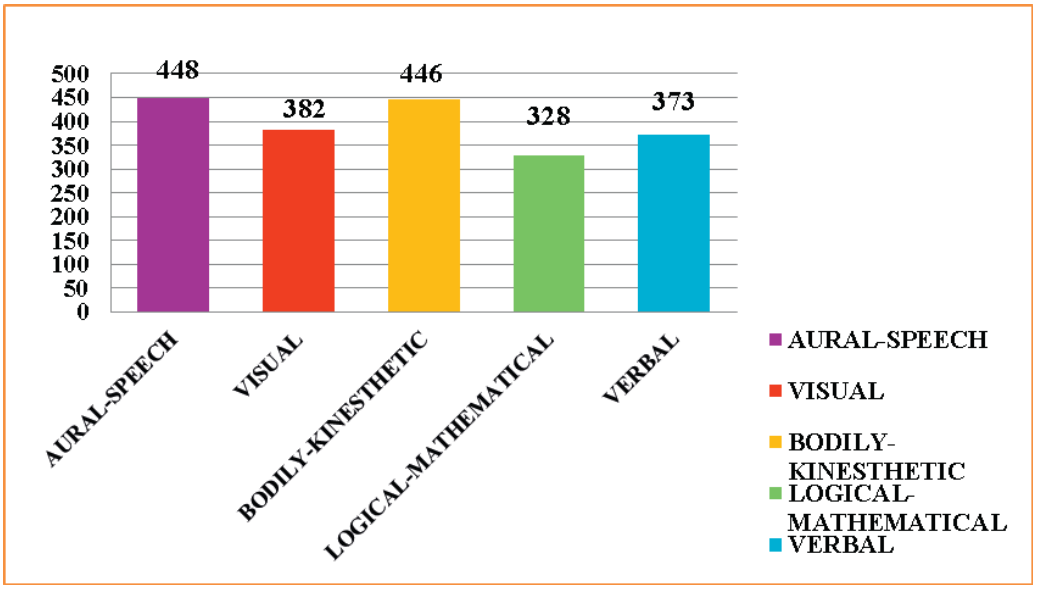

Fig. 1. Points scored – students aged 15 to 16 years.

4.2. The group of students at the age of 17 years

The group of students at the age of 17 years old had a total of 59 respondents (see Fig. 2.). Also in this sample, the aural-speech type of students is most represented (23.4%), followed by the bodily-kinesthetic type (22.7%). The third largest group of respondents in this sample are representatives of the verbal type of learning (19.7%), followed by representatives of the visual type (19.2%) and the logical-mathematical one (15%).

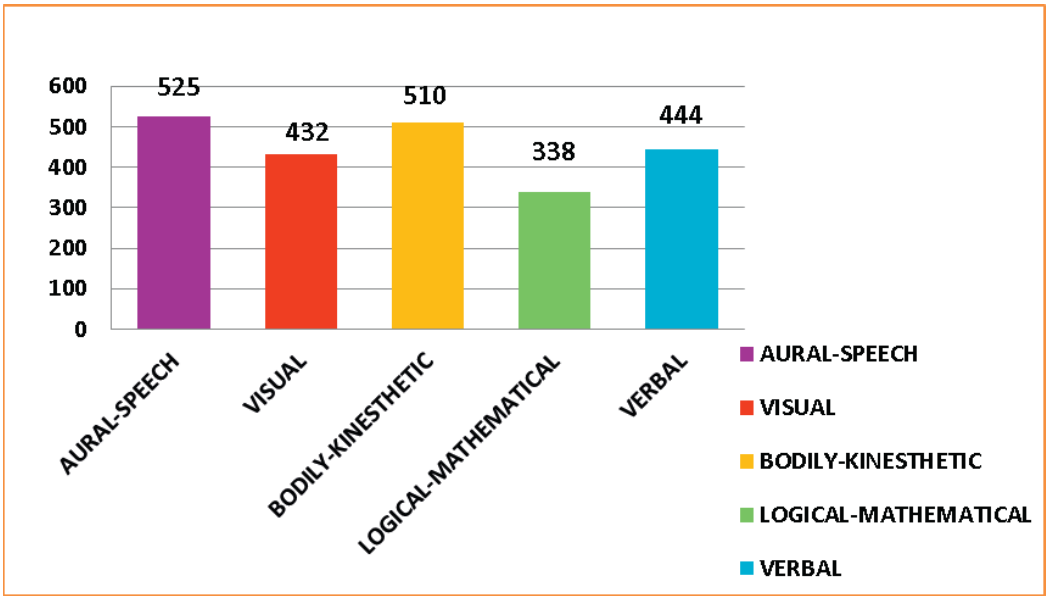

Fig. 2. Points scored – students aged 17 years.

4.3.The group of students at the age of 18 years

Fig. 3.shows the distribution of students in a 12-member group of 18-year-olds. The dominant type is the aural-speech one (24.7%), followed by the bodily-kinesthetic type (21.5%) and the visual type (20.5%). 19.1% of students belong to the verbal type, and the least frequent is the logical-mathematical type (14.2%). These results basically copy the previous ones without a significant change in the positions of the individual types.

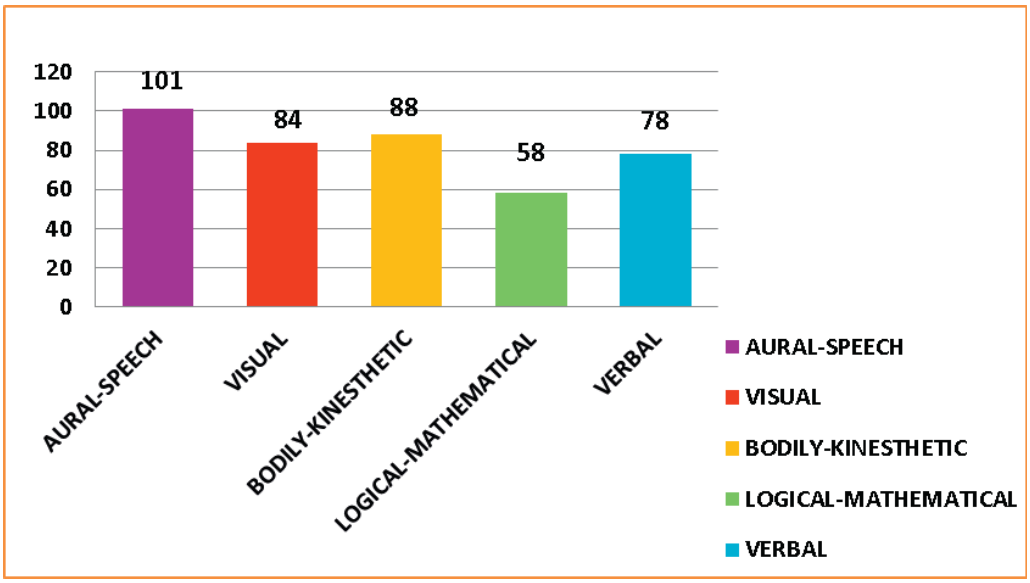

Fig. 3. Points scored – students aged 18 years.

4.4. The group of students aged 20 to 22 years

Fig. 4.shows answers of a total of 20 students aged 20 to 22 years. The sample of respondents is composed of individuals older than in the previous three groups. The fact that every year plays an important role in adolescence and forming of personality is also demonstrated by the results obtained – although the most represented type is the aural-speech one (22.9%) and the second largest group consists of representatives of the visual type (21.8%), which did not happen in any of the previous groups. The results obtained can be interpreted that at this age, students need, in addition to the teacher's verbal description also visual material. In foreign language teaching, it is therefore most suitable to include elements of audiovisual methods.

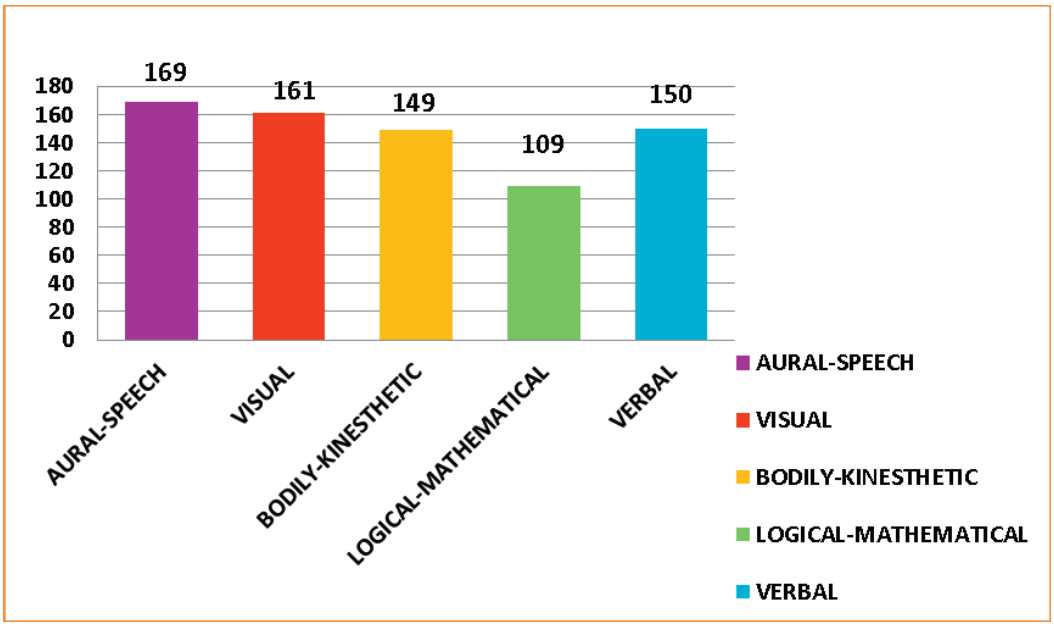

Fig. 4. Points scored – students aged 20 to 22 years.

4.5.The group of university students aged 23 to 24 years

The fifth chart presents the research results in a group of 13 respondents – university students aged 23 to 24 years (see Fig. 5.). The most numerous group in this sample are representatives of the verbal type of students (22.6%), followed by the bodily-kinesthetic type (22.4%) and the aural-speech type (20%). On the basis of the results one can conclude that the representatives of this age group are no longer dependent on the verbal description of the teacher and, on the contrary, prefer their own discussion with suggestions for solutions to problems or their own projects and their public presentation, which fully corresponds to the reality. The number of representatives of the visual type (17.4%) and the logical-mathematical type (17.6%) reflects the assumption that for older students there is usually no need for support in the form of visual images, diagrams or photos.

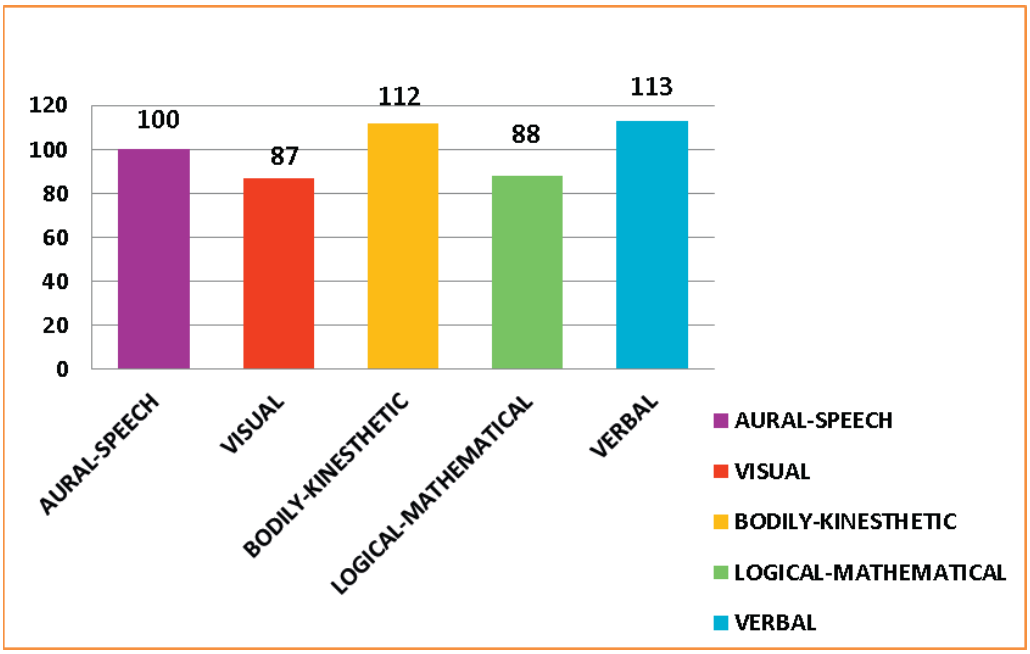

Fig. 5. Points scored – university students aged 23 to 24 years.

4.6. Summary

Last two charts present summary results of the research (see Fig. 6. and Fig. 7.). When sorting preferences of individual intelligence types in ascending order, the least frequent type of students is the logical-mathematical type (15.8%), which is confirmed by the partial results of our research as well as M. Sovák's claims.

The second least numerous group consists of representatives of the visual type (19.2%). At the beginning of the research, a hypothesis was formulated that due to the intense influence of mass media on shaping the personality of a child, the visual type of intellect will be predominant in the group of students. The results of the research did not confirm this assumption, on the contrary, it turned out that this type of students is among the least represented ones in the sample.

In third place is the verbal type of students (19.9%). All of the respondents were students of generally-oriented fields of studies or humanities disciplines; it can be noted that the result confirms the theory of H. Gardner, who claims that verbal types are mostly students of humanities, who like discussing problems.

The bodily-kinesthetic type of students (21.9%) is represented mainly by active students, who need motion and constant switching of activities in the course of one teaching unit. At the beginning of the research, we expected that the bodily-kinesthetic type of intellect would be represented in the research sample by only a small number of respondents, which would correspond to the decline in physical activity of children in contemporary society. Quite surprisingly, however, this type was in second place in the summary overview as to the number of points obtained, and it was significantly represented in all age categories.

The absolutely most widespread type of student in general seems to be the aural-speech type (23.2%). These individuals prefer aural memory; in teaching, work with recordings and other audio materials should prevail, and the teacher must be prepared for the fact that their speech will be a model for the students, who will imitate them. For this reason, it should not be deformed by accents or defects.

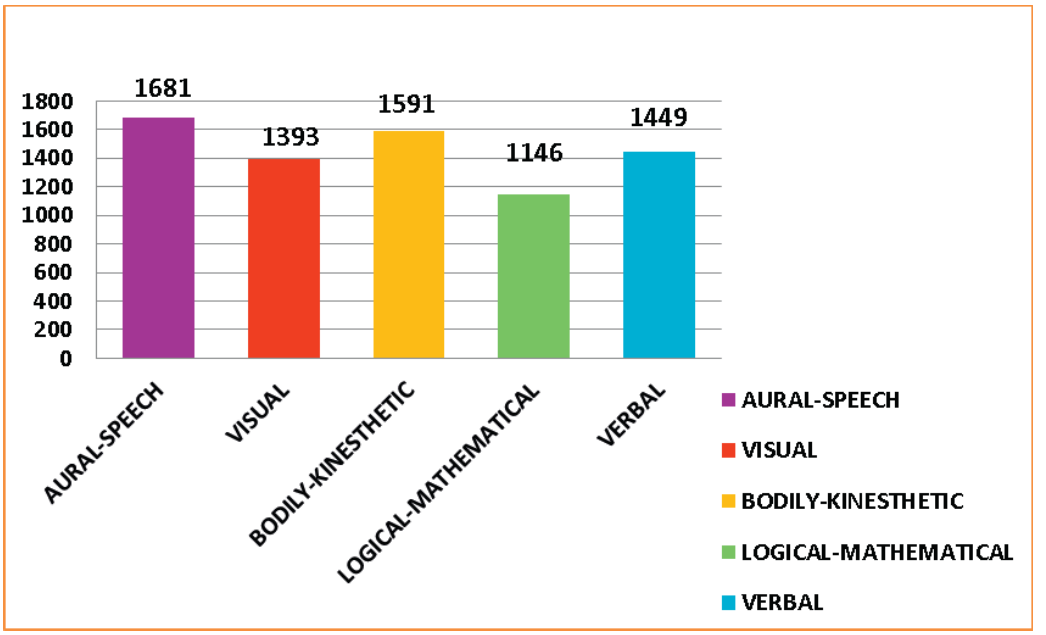

Fig. 6.Total points for different types of students.

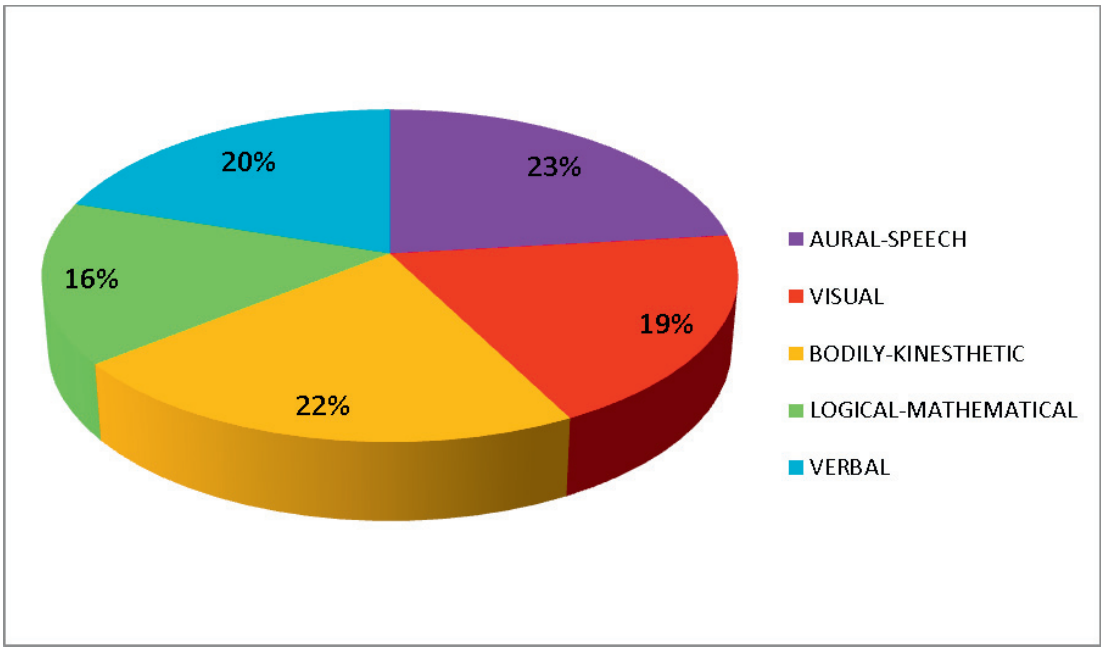

Fig. 7.Preferred intelligence type percentage of respondents.

5. Conclusion

This paper attempts to show that even though the children play videogames, watch TV and browse the internet in their free time nowadays, they still need to hear a new piece of information and to change activities during the lesson. In view of the fact that visual type of student is surprisingly not dominant as the questionnaire proved.
The charts also demonstrate that preferences of individual intelligence types change with age of students.

In conclusion, we express our agreement with the claim of J. Mareš that every child is a specific personality with individual learning styles that develop, and over time they permeate and change. It is then up to the teacher to respect students and try to understand their specificities at least to a certain extent. (Mareš, 1998).

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